A New Lutjanid Fish, Lutjanus stellatus, from Southern Japan and a Related Species, L. rivulatus (Cuvier)

Masato Akazaki

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Abstract The Japanese lutjanid which is known as "fuedai" in Japanese has been identified as Lutjanus rivulatus. However, this Japanese form is completely different from L. rivulatus in body forms and coloration. Since this fish has not been named scientifically, it is described as Lutjanus stellatus sp. nov. in this paper. This new species occurs only in southern Japan from Ibaraki to Okinawa. The differences between L. rivulatus and L. stellatus are as follows: Head length and pectoral fin length of L. rivulatus are longer than those of L. stellatus; in L. rivulatus 22~24 wavy, thin and blue lines are present on the snout and cheek, but in L. stellatus one longitudinal band is present on the snout; a grayish white dot on each scale of the body is present in L. rivulatus, but absent in L. stellatus; the posterior edge of the anal fin is pointed in L. rivulatus, but round in L. stellatus.

Diacope rivulata, a lutjanid species (snapper), was originally reported by Cuvier in 1828 on the basis of specimens from Pondicherry (India), Malabar (India), Colomandel (New Zealand), Java and Red Sea. Since then the generic name was changed to *Genyoroge* (Günther, 1859), Lutianus (Day, 1875~89), Lutjanus (Bleeker, 1876~1877), Mesoprion (Klunzinger, 1884), and Lutjanus which is now used as valid name.

Lutjanus rivulatus is widely distributed from the Red Sea, the east coast of Africa, India, Andaman, Indonesia, Philippines, New Guinea to New Zealand. In regard to Japanese lutjanid fish, the scientific name Lutjanus rivulatus was applied for the first time by Jordan and Snyder to a certain species based on a specimen from Yokohama in 1901. Since then many ichthyologists, for instance, Jordan and Thompson (1911), Kamohara (1950), Asano (1952) and Matsubara (1955), applied Lutjanus rivulatus to this fish. This form, called fuedai in Japanese, has a white spot above the lateral line below the origin of the soft dorsal.

The true *L. rivulatus* also has a white spot on the lateral line. Strangely enough, these two forms were not sufficiently compared of their characters other than the white spot on the body. Under the same scientific name *L. rivulatus*, both forms have been confused for a long time.

The writer collected two specimens of the true Lutjanus rivulatus from Ishigaki Island of the Yaeyama Islands in Okinawa Prefecture and compared them in detail with fuedai specimens from Miyazaki and Mie Prefectures. As a result, it was confirmed that these two are distinct species, different from each other in body form and coloration except for the white spot (Table 1). Thus it is revealed that the application of *Lutjanus rivulatus* to the fuedai is a mistake and a new species name must be applied. The writer reported "On the homonym of *Lutjanus rivulatus*" at the Autumn Conference of Japanese Society of Scientific Fisheries, 18 Oct., 1973. After that, Masuda et al. (1975) distinguished *L. rivulatus* and the true fuedai (*L.* sp) as separate species.

In this paper, the writer proposes a new species *Lutjanus stellatus*, referring to its stellar white spot, for the fuedai. Masuda et al. (1975) gave this species a substitute Japanese name "hoshifuedai". However, since many ichthyologists have used the name fuedai for a long time, the writer proposes to use "fuedai" for the sake of stability. The two species are described below.

Lutjanus rivulatus (Cuvier) (Japanese name: Namifuedai) (Figs. 1, 3A)

Diacope rivulata Cuvier, Hist. Nat. Poiss., vol.2, 1828: 414, pl. 38 (Colomandel, Pondicherry, Java, Red Sea, Malabar).

Genyoroge rivulata: Günther, Cat. Fish. Brit. Mus., vol. 1, 1859: 182 (China, Amboina, Red Sea).

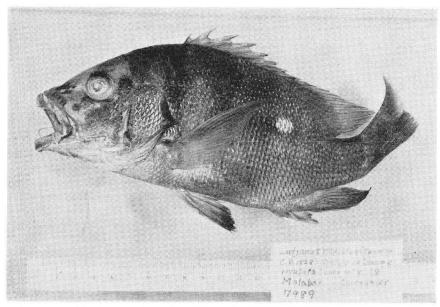


Fig. 1. A syntype of Lutjanus rivulatus (Diacope rivulata), MNHN 7989, 192.3 mm in standard length.

Lutianus rivulatus Day, Fishes of India, pt. 1, 1875: 37, pl. 11, fig. 4; Jordan and Thompson, Proc. U.S. Nat. Mus., vol. 39, 1911: 455 (Padang, Pago Pago).

Lutjanus rivulatus: Bleeker, Atlas ichthyologique des Indies orientales Neerlandaises, 8, 1876~77: 73, pl. 347, fig. 3 (Sumatra, Java, Bawean, Bali, Celebes, Timor, Batjan, Amboina, Waigiu); Weber and de Beaufort, The fishes of the Indo-Australian Archipelago, 1936: 287 ~ 289 (Java, Sumatra, Flores, Timor, Buru, Ambon, New Guinea); Fowler, U.S. Bull. 100, 1931: 111~115 Mus. (Cotabato, Iloilo, Palawan, Leyte, Samoa, Zamboanga, Borneo Padang); Kyûshin, Amaoka, Nakaya and Ida, Fishes of Andaman, 1973: 78 ~ 79 (Andaman).

Mesoprion rivulatus: Klunzinger, Fische Roth. Meer., 1884: 12 (Koseir, Red Sea).

Specimens examined. 2; M. 7402 (specimen stored in Miyazaki University), 195 mm in standard length, Ishigaki Island (Okinawa Prefecture), 20 September 1973; M. 2537, 417 mm, Ishigaki Island (Okinawa Pref.), 8 August, 1972.

Description. Head length $2.53 \sim 2.56$, body depth $2.24 \sim 2.36$, body width $4.69 \sim 5.27$, length of pectoral fin $2.86 \sim 2.91$ in standard length. Snout length $2.53 \sim 2.57$, length of upper jaw

 $2.35\sim2.66$, interorbital width $3.52\sim4.05$, eye diameter $4.81\sim6.23$, suborbital width $3.38\sim4.53$, 4th dorsal spine length $3.14\sim3.15$, 2nd anal spine length $3.21\sim4.38$, 3rd anal spine length $3.50\sim4.38$, pelvic fin length $1.71\sim1.78$ in head length. Suborbital width $0.54\sim0.94$ in eye diameter. Body width $1.97\sim2.35$ in body depth.

D. X, 15; A. III, 8; P_1 . 17~18; P_2 . I, 5. L1. 48+3=51; Ltr. 8~10+20; scale series on cheek+opercle 3+5~7. Number of gill rakers 6+10. Number of vertebrae 10+14=24.

Body ovoid and slightly compressed. Snout not projecting and nearly rectangular. Upper outline of snout a little convex and upper profile on eye slightly concave. Mouth moderately large and oblique, posterior edge of upper jaw reaching below the anterior nasal. Suborbital wide. Interorbital naked and well convex.

Four or six canines on the anterior part of upper jaw, three weak canines on lower jaw. One series of weak conical teeth on lateral outer side of both jaws and patches of villiform teeth on lateral inner side on both jaws. A crescent band of villiform teeth on vomer and short patches on each palatine. Hind edge of preopercle serrated, and a slight gash at the central part of the posterior margin of preopercle.

Pectoral fin elongate and foliated, its posterior edge reaching anus. Anal fin a little pointed at the posterior soft portion. Caudal fin moderately bifurcate. Caudal peduncle high.

Series of scales above lateral line running obliquely upward, and scales below lateral line running in horizontal series. Scale sheath on the base of dorsal and anal fins moderately high.

Color: Body uniformly purple brown, belly pale brown. Each fin yellowish brown. Head with $22 \sim 24$ wavy, thin and bluish lines running parallel horizontally. A white spot on lateral line below soft dorsal bases. Each scale on the back and sides of body with a small white or gray dot.

Distribution. In Japan, *L. rivulatus* is only known from Ishigaki Island of Okinawa Prefecture. But, this species is widely distributed

from the Southwest Pacific, Indian Ocean, Red Sea, to the east coast of Africa.

Comparison between a syntype of *Lutjanus rivulatus* (*Diacope rivulata* Cuvier) in the Paris Museum (MNHN 7989) and the two specimens (M. 7402, M. 2537) from Ishigaki Island showed that both agree in many points of external characters, i.e., teeth $(3\sim6$ canines and 1 series of $9\sim10$ conical teeth on both jaws), number of transverse scales above the lateral line (8 below the middle dorsal spine) and speckles (a small white dot on each scale of the body and one white spot on the lateral line under the origin of soft dorsal).

Lutjanus stellatus sp. nov. (Japanese name: Fuedai (Hoshifuedai)) (Figs. 2, 3B)

Lutjanus rivulatus: Jordan and Snyder, Annot.

Table 1. Counts and proportional measurements of Lutjanus rivulatus and L. stellatus sp. nov.

| Items | L. stellatus sp. nov. | | L. rivulatus | |
|-------------------------|-----------------------|--------------------------------------|--------------|----------------------|
| | Holotype | Paratypes | Syntype | Ishigaki specimen |
| | | ZUMT 54350, BSKU. 38360 | | |
| | | NSMT-P 21489, M. 2534 | MNHN. | M. 7402 |
| Catalogue No. | M. 7407 | M. 7406, FRSKU-S-4085 | 7989 | M. 2537 |
| | | M. 7408, HUMZ-97092 | | |
| Standard length in mm | 304.5 | 227 ~ 375 | 192.3 | 195~417 |
| Dorsal fin | X, 14 | $X, 13 \sim 15$ | X, 16 | X, 15 |
| Anal fin | III, 8 | III, 8 | III, 8 | III, 8 |
| Pectoral fin | 18 | 16~18 | 17 | 17 ~ 18 |
| Pored scales on lateral | 49 + 7 = 56 | $46 \sim 49 + 2 \sim 7 = 49 \sim 56$ | 49+6=55 | 48 + 3 = 51 |
| line (+on caudal) | | | | |
| Transverse scales above | | | | |
| and below lateral line | 12/21 | $11 \sim 12/19 \sim 23$ | 8/18 | $8 \sim 10/20$ |
| Gill rakers on 1st arch | 5+12 | $5 \sim 6 + 11 \sim 13$ | 6 + 13 | 6 + 10 |
| No. of vertebrae | 10 + 14 | 10 + 14 | _ | 10 + 14 |
| In standard length | | | | |
| Head length | 2.70 | $2.47 \sim 2.80$ | 2.35 | $2.53 \sim 2.56$ |
| Body depth | 2.50 | $2.28 \sim 2.62$ | 2.41 | $2.24 \sim 2.36$ |
| Pectoral fin length | 2.98 | $2.91 \sim 3.17$ | 2.88 | $2.86 \sim 2.91$ |
| In head length | | | | |
| Snout length | 2.45 | $2.14 \sim 2.86$ | 2.81 | $2.53 \sim 2.53$ |
| Length of upper jaw | 2.51 | $2.39 \sim 2.78$ | 2.69 | $2.35 \sim 2.66$ |
| Interorbital width | 3.89 | $3.45 \sim 4.65$ | 4.56 | $3.52 \sim 4.05$ |
| Eye diameter | 5.42 | $4.00 \sim 6.45$ | 5.29 | $4.81 \sim 6.23$ |
| Suborbital width | 4.03 | $3.84 \sim 5.20$ | 5.06 | 3.38~4.5 |
| Pelvic fin length | 1.71 | 1.57~1.91 | 1.71 | $1.71 \sim 1.78$ |
| 4th dorsal spine length | 2.83 | $2.89 \sim 3.08$ | 2.95 | $3.14 \sim 3.13$ |
| 2nd anal spine length | 3.47 | $2.44 \sim 3.64$ | 3.04 | $3.21 \sim 4.38$ |
| 3rd anal spine length | 3.27 | $3.01 \sim 3.80$ | 3.07 | $3.50 \sim 4.38$ |

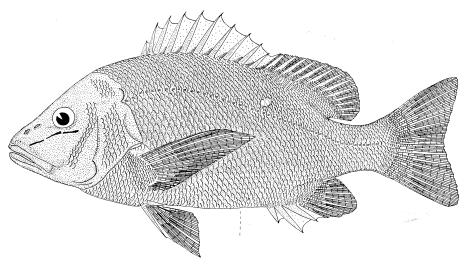


Fig. 2. Lateral aspect of holotype of *Lutjanus stellatus* sp. nov., M. 7407, 304.5 mm in standard length, from Udo, Nichinan City, Miyazaki Pref., Japan.

Zool. Japon, vol. 3, 1901: 76 (Yokohama); Kamohara, Description of the fishes from the provinces of Tosa and Kishu, Japan., 1950: 132 (southern Japan); Tanaka and Abe, Description and figures of one thousand useful fishes of Japan, 1955: 119 (southern Japan); Matsubara, Fish morphology and hierarchy, 1955: 661 (southern Japan).

Lutjanus sp.: Masuda, Araga and Yoshino, Coastal fishes of southern Japan, 1975: 238, pl. 64-D (southern Japan).

Holotype. M. 7407, 304.5 mm in standard length, caught by a trap net at Udo, Nichinan City, Miyazaki Prefecture, Japan, on 10 August 1981.

Paratypes. 8 specimens: ZUMT 54350 (Section Zool., Univ. Mus., Univ. Tokyo), 243 mm in standard length, Kushima City, Miyazaki Prefecture, Japan, 25 July 1973; M. 2533, 375 mm, Kawaminami, Miyazaki Pref., 20 July 1973; BSKU 38360 (Dept. of Biol., Fac. of Sci., Kochi Univ.), 236.5 mm, Kawaminami, 30 July 1978; NSMT-P 21489 (Nat. Sci. Mus., Tokyo), 373 mm, Mihama-chô, Mie Pref., 12 August 1967; HUMZ-97092 (Hokkaido Univ. Mar. Zool.) (♂), FRSKU-S-4085 (Fish. Res. Sta. Kyoto Univ.) (♂), M. 7406 (♂), 237 mm, 227 mm, 230 mm, respectively, Udo, Nichinan City, Miyazaki Pref., 11 August 1981; M. 7408 (♀), 349 mm, Udo, Miyazaki Pref., 13 August 1981.

Diagnosis. Lutjanus stellatus is distinguished

in the following characters from other lutianid fishes in southern Japan. A. L. stellatus has a white spot on the body side, but other species have not such a white spot except for L. bohar and L. rivulatus. The position and size of the white spot are different from those of L. bohar and L. rivulatus. B. There are no black spots on the body of L. stellatus (present in L. russellii, L. monostigma, L. fulviflamma), no black streak (present in L. vitta), no blue lines (present in L. kasmira and L. spilurus) and no yellow lines (present in L. lineolatus, L. lutjanus, L. lineatus, L. rufolineatus, L. caeruleovittatus). C. L. stellatus is close to L. vaigiensis, but the latter has each fin fringed with a yellow margin. D. Further differences between L. stellatus and L. rivulatus are: a) head and pectoral fin of L. rivulatus are longer than those of L. stellatus; b) grayish white dot on each scale of the body is present in L. rivulatus, but absent in L. stellatus: c) posterior edge of anal fin is pointed in L. rivulatus, but round in L. stellatus; d) a white spot is present on lateral line in L. rivulatus, but between soft dorsal origin and lateral line in L. stellatus; e) head with 22~24 wavy and bluish lines in L. rivulatus, but snout with one longitudinal blue bar in L. stellatus. Young specimens of L. stellatus always have $2 \sim 3$ longitudinal blue bars, of which upper and lower bars disappear in alcohol.

Description of holotype. Head length 2.70,



Fig. 3. A: Lutjanus rivulatus, M. 2537, 417 mm SL. B: Holotype of Lutjanus stellatus sp. nov., M. 7407, 304.5 mm SL.

body depth 2.50, body width 5.32, pectoral fin length 2.98 in standard length. Snout length 2.45, length of upper jaw 2.51, interorbital width 3.89, eye diameter 5.42, suborbital width 4.03, 4th dorsal spine length 2.83, 2nd anal spine length 3.47, 3rd anal spine length 3.27, pelvic fin length 1.71 in head length. Suborbital width 0.74 in eye diameter. Body width 2.13 in body depth.

D. X, 14; A. III, 8; P_1 . 18; P_2 . I, 5. Ll. 49+7 = 56; Ltr. 12+21; scale series on cheek +

opercle 3+7. Number of gill rakers on 1st arch 5+12. Number of vertebrae 10+14=24.

Body slightly elongate, oval and well compressed. Snout projecting at an acute angle. Upper profile of head nearly straight, but becoming slightly concave on nasal region. Mouth large and oblique. Posterior margin of upper jaw reaching below middle of eye. Suborbital width wide. Interorbital space well convex.

Four canines on the anterior part of upper jaw, three canines on lower jaw. A series of $12 \sim$

14 weak conical teeth on lower jaw laterally and a short patch of villiform teeth on lateral inner side on both jaws. Tooth band on vomer inverted V-shaped and teeth on palatines in a short bar.

Posterior margin of preopercle finely serrated and its lower margin with somewhat large denticulations. A gentle and shallow notch at the posterior margin of preopercle.

Spinous part of dorsal fin continues to soft ray part, with a slight notch. Pectoral fin slightly shorter than head length and its posterior edge reaching the origin of anal fin. Pelvic fin originates below the origin of pectoral fin. Posterior margin of caudal fin slightly bifurcate. Caudal peduncle somewhat high.

Series of scales above lateral line running obliquely upward and below lateral line horizontally. Scale sheath on the base of dorsal and anal fins slightly high. The caudal fin densely scaly. Three and five series of scales on cheek and opercle respectively. Elongate, somewhat small, triangular scales present outside the origin of pelvic fin. Ctenoid scales on the side of body pentagonal in shape.

Gill rakers flat and long, comb-like in shape at center and on lower arch, but those on upper arch and the edge of lower arch knob-like.

Color: Body brown, tinged with orange, belly pale yellowish brown or pale orange. A longitudinal blue bar from snout to opercle. Each fin yellowish brown, vertical fins with dark grayish tint. A pearl white spot on side below soft dorsal origin, occupying about three scales $2 \sim 3$ rows above lateral line.

In alcohol, body grayish brown with a slightly distinct grayish white spot above lateral line. A dark gray bar tinged with pale blue running

horizontally from snout to suborbital.

Description of paratypes. Head length $2.47 \sim 2.80$, body depth $2.28 \sim 2.62$, body width $4.63 \sim 6.24$, pectoral fin length $2.91 \sim 3.16$ in body length. Snout length $2.14 \sim 2.86$, length of upper jaw $2.39 \sim 2.78$, interorbital width $3.45 \sim 4.65$, eye diameter $4.00 \sim 6.45$, suborbital width $3.84 \sim 5.20$, 4th dorsal spine length $2.89 \sim 3.08$, 2nd anal spine length $2.44 \sim 3.64$, 3rd anal spine length $3.01 \sim 3.80$, pelvic fin length $1.57 \sim 1.91$ in head length. Body width $1.93 \sim 2.50$ in body depth. Suborbital width $0.59 \sim 0.88$ in eye diameter.

D. X, $13 \sim 15$ (mostly $14 \sim 15$); A. III, 8; P_1 . $16 \sim 18$ ($17 \sim 18$); P_2 . I, 5. L1. $46 \sim 49 + 2 \sim 7$ = $49 \sim 56$; Ltr. $11 \sim 12 + 19 \sim 23$; scale series on cheek+opercle $3 \sim 4 + 5 \sim 8$. Number of gill rakers on 1st arch $5 \sim 6 + 11 \sim 13 = 17 \sim 22$. Number of vertebrae 10 + 14 = 24.

Body form of paratypes similar to that of holotype. One or three pairs of canines on the anterior part of both jaws, and $13 \sim 20$ weak conical teeth on the lateral outer sides of both jaws. Anus located at posterior one-third between the origins of pelvic and anal fins.

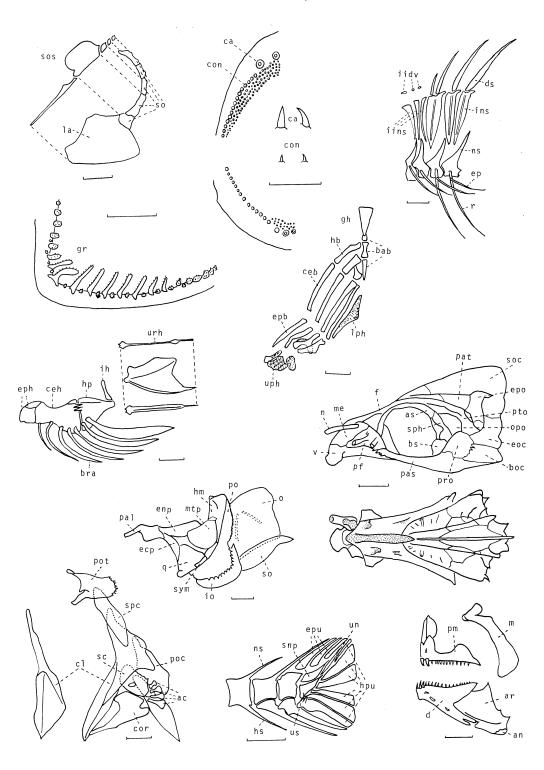
Color: Typical color of body the same as that of holotype. A pearl white spot between soft dorsal origin and lateral line, extending on two or three scales.

Internal characters (Fig. 4). The description below and Fig. 3 are based mainly on a specimen of 230 mm in standard length except for the shoulder girdle, hyoid arch and gill arch which are described from a specimen of 264 mm in standard length (M. 7403).

Jaws: Premaxillary pedicel slightly shorter than lamina. Angle formed by premaxillary pedicel and lamina about a right angle. Arti-

Fig. 4. Internal characters of *Lutjanus stellatus* sp. nov. ac, actinosts; an, angular; ar, articular; as, alisphenoid; bab, basibranchial; boc, basioccipital; bra, branchiostegal; bs, basisphenoid; ca, canine; ceb, ceratobranchial; ceh, ceratohyal; cl, cleithrum; con, conical teeth; cor, coracoid; d, dentary; ecp, ectopterygoid; eoc, exoccipital; enp, endopterygoid; epb, epibranchial; eph, epihyal; epo, epiotic; ep, epipleural; epu, epural; f, frontal; gh, glossohyal; gr, gill raker; hb, hypobranchial; hm, hyomandibular; hp, hypohyal; hpu, hypural; hs, haemal spine; ih, interhyal; iidv, dorsal view of imperfect interneural spine; iins, imperfect interneural spine; ins, interneural spine; io, interopercle; la, lachrimal; lph, lower pharyngeal; m, maxillary; me, mesoethmoid; mtp, metapterygoid; n, nasal; ns, neural spine; o, opercle; opo, opisthotic; pal, palatine; pas, parasphenoid; pat, parietal; pf, prefrontal; pm, premaxillary; po, preopercle; poc, postcleithrum; pot, posttemporal; pro, prootic; pto, pterotic; q, quadrate; r, rib; sc, scapula; snp, special neural process; so, suborbital; soc, supraoccipital; sop, subopercle; sos, suborbital shelf; spc, supracleithrum; sph, sphenotic; sym, symplectic; un, uroneural; urh, urohyal; us, urostyle. Scale bars indicate 10 mm.

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cular connects with dentary, but upper margin of the joint notched deeply.

Cranium: Cranium slightly elongate. Parasphenoid with a flat process on lower side. Anterior part of vomer projecting forward as a rod. Frontals separated by a deep longitudinal groove at middle part. Opisthotic bones visible. Epiotic not furcate at the edge.

Orbital bones: Lachrimal ten times as large as 1st suborbital bone and a trapezoid in shape. Suborbital bones 5 in number, 2nd ~ 5th suborbital bones short and bar-like in shape. Suborbital shelf projecting inward from 2nd suborbital, and elliptical in shape.

Suspensorium: Palatine M-shape, anterior part tapering and bar-like. Endopterigoid slightly inclined obliquely inward and upward, and elliptical in shape. The post-lower margin of preopercle finely serrate, with about 30+15 teeth, and with a shallow notch at middle part.

Shoulder girdle: Post temporal V-shape. Upper-posterior margin of cleithrum gently curved, not incised at a right angle or more. Position of the 4th actinost between scapura and coracoid.

Hyoid arch: Branchiostegal rays 7 in number, anterior 5 rays attach to ceratohyal, posterior 2 to epihyal. Urohyal flat, elongate and trapezoid in shape.

Anterior abdominal vertebrae: First and second neural spines close to each other. Imperfect interneural spines 3 in number, 1st one before 1st neural spine, 2nd one between 1st and 2nd neural spines, 3rd one with 1st interneural spine between 2nd and 3rd neural spines. Second and 3rd interneural spines between 3rd and 4th neural spines. Pattern of neural and interneural spines 1–1–1. I–II (Arabic numerals—imperfect interneural spines; Roman numerals—interneural spines).

Caudal skeleton: Around urostyle, which forms the posterior end of the vertebral column, are arranged from top to bottom, 3 pieces of epurals, one uroueural spine, one specialized neural process and 6 pieces of hypural bones.

Gill-arch: Second basibranchial hourglasslike in shape. Third basibranchial elongate, bar-like and tapering backward. Third basibranchial slightly longer than 2nd basibranchial.

Distribution. This new species of the Lutjanidae occurs along the coast of the southern

Japan, from Ibaraki Prefecture (Asano, 1952) to Okinawa (Gushiken, 1972), but is not known from the Yaeyama Islands (Ishigaki and Miyako Islands) and from Southwest Pacific and Indian Ocean.

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(Department of Fisheries, Faculty of Agriculture, Miyazaki University, Funazuka, Miyazaki 880, Japan)

日本産フエダイの 1 新種 Lutjanus stellatus とその類似種 L. rivulatus

赤崎正人

日本のみから知られるフエダイ科魚類の1種フエダ

イ (ホシフエダイ) の学名はこれまで Lutjanus rivulatus とされて来たが、形態、斑紋などの点で真の L. rivulatus ナミフエダイとは完全に異なっている。従ってフエダイに対して新学名 Lutjanus stellatus を提唱する。この L. stellatus は次の特徴で L. rivulatus と区別される。1. L. stellatus の頭長、胸鰭長は L. rivulatus のそれより短い。2. L. stellatus の吻部には一条の青色縦線があるが、L. rivulatus には 22~24 本の波状青色縦線がある。3. L. rivulatus の各体側鱗の上には小灰白色点があるが、L. stellatus にはない、側線上方の白色点は位置に多少の差異があるが両者ともに存在する。4. L. stellatus の臀鰭の後端は円いが、L. rivulatus では尖っている。

(880 宮崎市船塚 3-210 宮崎大学農学部水産増殖学 科)